(15) (a)

$$\sin 2x + 6\cos x = 0$$

$$2\sin x \cos x + 6\cos x = 0$$

$$2\cos x(\sin x + 3) = 0$$

$2\cos x = 0$

$\cos x = 0$

$x = 90^\circ, 270^\circ$

$\sin x + 3 = 0$

$\sin x = -3$

$x =$ No solutions

(b) $\sin 4x + 6\cos 2x = 0$

$2x = \overbrace{90^\circ, 270^\circ}^{+360}, 450^\circ, 630^\circ$

$x = 45^\circ, 135^\circ, 225^\circ, 315^\circ$

Question			Generic scheme	Illustrative scheme	Max mark
15.	(a)		$\bullet^1$ substitute appropriate double angle formula $\bullet^2$ factorise $\bullet^3$ solve for $\cos x°$ and $\sin x°$ $\bullet^4$ solve for x	$\bullet^1$ $2\sin x°\cos x° + 6\cos x° = 0$ $\bullet^2$ $2\cos x°(\sin x° + 3) = 0$ $\bullet^3$ $\cos x° = 0$ $\quad$ $\bullet^4$ $\sin x° = -3$ $\bullet^4$ $x = 90,\ 270$ 'no solutions'	**4**

Notes:

1. Do not penalise the absence of '$=0$' at $\bullet^1$ and $\bullet^2$.
2. Do not penalise the absence of '2' as a common factor at $\bullet^2$.
3. Do not penalise the omission of degree signs.
4. Candidates who leave their answer in radians do not gain $\bullet^4$ (if marking horizontally) or $\bullet^3$ (if marking vertically).
5. $\bullet^4$ is only available if one of the equations at $\bullet^3$ has no solution.
6. Accept ~~$\sin x° = -3$~~ at $\bullet^4$.

Commonly Observed Responses:

Candidate A

$2\sin x\cos x = -6\cos x$ $\quad$ $\bullet^1$ ✓

$2\sin x = -6$ $\quad$ $\bullet^2$ ^ $\bullet^3$ ^

~~$\sin x = -3$~~ $\quad$ $\bullet^4$ ✓ 1

Candidate B - insufficient evidence for $\bullet^3$

$2\sin x°\cos x° + 6\cos x° = 0$ $\quad$ $\bullet^1$ ✓

$2\cos x°(\sin x° + 3) = 0$ $\quad$ $\bullet^2$ ✓

$2\cos x° = 0$, $\sin x° = -3$ $\quad$ $\bullet^3$ ^ $\bullet^4$ ^

However,

$x = 90,\ 270$, 'no solutions' $\quad$ $\bullet^3$ ✓ $\bullet^4$ ✓

	(b)		$\bullet^5$ state solutions	$\bullet^5$ 45, 135, 225,315	**1**

Notes:

Commonly Observed Responses: